Oral Communication 05 | Invited Speaker

Space-time modelling of mosquito densities: application to Aedes albopictus, vector of viruses, in Reunion Island

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Context: *Aedes albopictus* mosquitoes transmit many viruses like those responsible of Chikungunya, Dengue fever and Zika, which are diseases of major concern worldwide. Accurate understanding and prediction of the spatial and temporal distributions of their densities are needed to optimize surveillance and control of several important arboviroses. Among the environmental drivers of their distribution and abundance, meteorological conditions significantly determine their dynamics.

Objectives: Taking the example of *Aedes albopictus* in Reunion Island, this study had three main objectives i) modelling the densities of *Aedes albopictus* mosquito in time, as a function of meteorological data; ii) extrapolating the model throughout the island using a land cover characterization; iii) providing operational tools for surveillance and control of vector populations, in order to optimize surveillance and control of mosquito-borne diseases.

Methods: Different models were developed, using process-based and data-based approaches linking meteorological variables (daily temperature and rainfall) and entomological collections of *Aedes albopictus* larvae from 9 sites located around the Island.

A land cover classification derived from SPOT-5 imagery allowed to spatialize an environment-dependent parameter of the process-based model and consequently the prediction of the mosquito densities at the island scale. Eventually, a user-friendly interface was developed in order to make the models and their results easily operational by the vector-control actors.
Results. The predicted abundance of *Aedes albopictus* fit well with field observations, with Spearman's correlation coefficients ranging from 0.45 to 0.90. Higher correlations were obtained in places with a higher seasonality of the mosquito population dynamics.

Conclusions: A flexible and efficient tool that predicts mosquito abundance based on local environmental and meteorological factors was developed. It is operational with a simplified user-friendly interface and used by vector-control agencies to target surveillance areas on Reunion Island.